

1 WHAT IS CLAIMED IS:

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1. A polarizing element for dividing light
into first and second polarized lights differing in
polarized state from each other by a polarizing
5 dividing surface, directing said first polarized
light in a first direction, reflecting said second
polarized light by a reflecting surface and directing
it in said first direction, and varying the polarized
state of at least one of said first and second
10 polarized lights, to thereby make the polarized
states of said first and second polarized lights
coincident with each other, characterized in that
said polarizing dividing surface is disposed on one
surface of a plane parallel plate and said reflecting
15 surface is disposed on the other surface of the plane
parallel plate, and said light enters obliquely from
said one surface or said other surface.

2. A polarizing element according to Claim
20 1, wherein half wavelength optical phase film is
formed at a predetermined location on said one
surface of said plane parallel plate to vary the
polarized state of at least one of said first and
second polarized lights to thereby make the polarized
25 states of said two polarized lights coincident with
each other.

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1 3. A polarizing element according to Claim
1, wherein a half wavelength optical phase plate is
disposed in the optical path of at least one of said
first and second polarized lights to vary the
5 polarized state of at least one of said first and
second polarized lights to thereby make the polarized
states of said two polarized lights coincident with
each other.

10 4. A polarizing element according to Claim
1, wherein a half wavelength optical phase plate is
formed at a predetermined location on said one
surface or said other surface of said plane parallel
plate to vary the polarized state of at least one
15 of said first and second polarized lights to thereby
make the polarized states of said two polarized
lights coincident with each other.

20 5. A polarizing conversion unit having:
an illuminating system for supplying a
lattice-like light pattern; and
a polarizing element for converting said
lattice-like light pattern into substantially dense
polarized light;
25 said polarizing element having a polarizing
dividing surface disposed on one surface of a plane
parallel plate and a reflecting surface disposed on

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1 emitting elements.

8. A polarizing conversion unit according
to Claim 5, wherein said illuminating system is
5 provided with a single light source portion, and a
cylindrical lens for dividing the light from said
light source portion into a plurality of partial
lights.

10 9. A polarizing conversion unit according
to Claim 5, wherein said illuminating system is
provided with a single light source portion, and
a fly-eye lens for dividing the light from said
light source portion into a plurality of partial
15 lights.

10. A polarizing conversion unit according
to Claim 5, wherein a half wavelength optical phase
plate is disposed in the optical path of at least
20 one of said first and second polarized lights to vary
the polarized state of at least one of said first and
second polarized lights to thereby make the polarized
states of said two polarized lights coincident with
each other.

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11. A polarizing conversion unit according
to Claim 10, wherein said half wavelength optical

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12. A polarizing conversion unit according to Claim 11, wherein said polarizing dividing surface and said half wavelength optical phase plate are alternately formed correspondingly to said lattice-like light pattern, and the lattice-like light from said illuminating system enters from said polarizing dividing surface on said one surface.

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14. A polarizing conversion unit according to Claim 13, wherein said quarter wavelength optical phase plate is formed on substantially the whole of said one surface or said other surface of said plane parallel plate.

15. A polarizing conversion unit according

1 to Claim 13, wherein said quarter wavelength optical
phase plate is formed on substantially the whole of
said one surface or said other surface of said plane
parallel plate, said reflecting surface is further
5 formed on substantially the whole of said other
surface, and the light from said illuminating system
enters from said one surface.

16. A polarizing conversion unit according
10 to Claim 5, wherein said reflecting surface is formed
on substantially the whole of said other surface of
said plane parallel plate.

17. A polarizing conversion unit according
15 to Claim 5, wherein said polarizing dividing surface
is formed on substantially the whole of said one
surface of said plane parallel plate.

18. A polarizing conversion unit according
20 to Claim 17, wherein a half wavelength optical phase
plate is provided on the polarizing dividing surface
formed on substantially the whole of said one
surface, correspondingly to said lattice-like light,
to vary the polarized state of at least one of said
25 first and second polarized lights to thereby make the
polarized states of said two polarized lights
coincident with each other, and the light from

1 said illuminating system enters from said one
surface.

19. A polarizing conversion unit according
5 to Claim 18, wherein said reflecting surface is
formed on substantially the whole of said other
surface of said plane parallel plate.

20. A polarizing conversion unit according
10 to Claim 5, wherein said polarizing dividing surface
is disposed on one surface of said plane parallel
plate, and the lattice-like light from said
illuminating system enters from said one surface
or said other surface.

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21. A projector having:
an illuminating system for supplying a
lattice-like light pattern:

a polarizing element for converting said
20 lattice-like light pattern into substantially dense
polarized light;

said polarizing element having a polarizing
dividing surface disposed on one surface of a plane
parallel plate and a reflecting surface disposed on
25 the other surface of the plane parallel plate, the
lattice-like light pattern from said illuminating
system entering obliquely from said one surface or

an image generator for modulating said dense polarized light in conformity with a video signal to thereby generate image light; and

15 a projecting optical system for projecting said image light.

22. A projector having:
a light source for supplying light;
color resolving means for resolving said
light into red, green and blue lights;
means for converting each of said red,
green and blue lights into a lattice-like light
pattern, said means being disposed in the optical
paths of said red, green and blue lights;
a polarizing element disposed in the optical

5 said polarizing element having a polarizing
dividing surface disposed on one surface of a plane
parallel plate and a reflecting surface disposed on
the other surface of the plane parallel plate, said
lattice-like light pattern entering obliquely from
said one surface or said other surface, partial
10 lights forming said lattice-like light pattern being
divided into first and second polarized lights
differing in polarized state from each other by said
polarizing dividing surface, said first polarized
light being directed in a first direction, said
15 second polarized light being reflected by said
reflecting surface and directed in said first
direction, the polarized state of at least one of
said first and second polarized lights being varied
to thereby make the polarized states of said first
20 and second polarized lights coincident with each
other;

an image generator for modulating said dense polarized light in conformity with a video signal to thereby generate image light, said generator being disposed in the optical path of each of said red, green and blue lights and generating each of red, green and blue image lights; and

23. A projector having:
a light source for supplying light;
color resolving means for resolving said
light into red, green and blue lights;

15 a polarizing element disposed near said
converting means for converting each of said lattice-
like light patterns into substantially dense
polarized light

said polarizing element having a polarizing dividing surface disposed on one surface of a plane parallel plate and a reflecting surface disposed on the other surface of the plane parallel plate, said lattice-like light pattern entering obliquely from said one surface or said other surface, partial lights forming said lattice-like light pattern being divided into first and second polarized lights differing in polarized state from each other by said polarizing dividing surface, said first polarized light being directed in a first direction, said

an image generator for modulating said
dense polarized light in conformity with a video
10 signal to thereby generate image light, said
generator being disposed in the optical path of
each of said red, green and blue lights and
generating each of red, green and blue image lights;
and

24. A polarizing element for dividing light into reflected light and transmitted light differing in polarization direction from each other by a polarizing dividing surface, reflecting said reflected light by a reflecting surface and directing it in a direction substantially parallel to said transmitted light, and varying the polarization direction of said reflected light to thereby make it coincident with the polarization direction of said transmitted light, characterized in that said

25. A polarizing element according to Claim 24, wherein a quarter wavelength optical phase plate is provided on substantially the whole surface between said one surface of said plane parallel plate and said polarizing dividing surface to vary the polarization direction of said reflected light to thereby make it coincident with the polarization direction of said transmitted light.

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27. A polarizing element according to Claim 24, wherein a quarter wavelength optical phase plate

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1 lattice-like light pattern into substantially dense
polarized light;

2 said polarizing element having a polarizing
dividing surface provided on substantially the whole
5 of one surface of a plane parallel plate and a
reflecting surface intermittently provided on the
other surface of the plane parallel plate, the
lattice-like light pattern from said illuminating
system entering obliquely from said other surface,
10 partial lights forming said lattice-like light
pattern being divided into reflected light and
transmitted light differing in polarization direction
from each other by said polarizing dividing surface,
said reflected light being reflected by said
15 reflecting surface and directed in a direction
substantially parallel to said transmitted light,
the polarization direction of said reflected light
being varied to thereby make it coincident with the
polarization direction of said transmitted light.

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31. A polarizing conversion unit according
to Claim 30, wherein said illuminating system is
provided with a light source portion comprising a
number of light emitting elements arranged side by
25 side, and cylindrical lenses corresponding to said
light emitting elements.

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1 32. A polarizing conversion unit according
to Claim 30, wherein said illuminating system is
provided with a single light source portion, and
a cylindrical lens for dividing the light from said
5 light source portion into a plurality of partial
lights.

 33. A projector having:
an illuminating system for supplying a
10 lattice-like light pattern;
a polarizing element for converting said
lattice-like light pattern into substantially dense
polarized light;
said polarizing element having a polarizing
15 dividing surface provided on substantially the whole
of one surface of a plane parallel plate and a
reflecting surface intermittently provided on the
other surface of the plane parallel plate, the
lattice-like light pattern from said illuminating
20 system entering obliquely from said other surface,
partial lights forming said lattice-like light
pattern being divided into reflected light and
transmitted light differing in polarization direction
from each other by said polarizing dividing surface,
25 said reflected light being reflected by said
reflecting surface and directed in a direction
substantially parallel to said transmitted light,

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an image generator for modulating said dense
5 polarized light in conformity with a video signal to
thereby generate image light; and
a projecting optical system for projecting
said image light.

10 34. A projector having:
a light source for supplying light;
color resolving means for resolving said
light into red, green and blue lights;
means for converting each of said red,
15 green and blue lights into a lattice-like light
pattern, said means being disposed in the light path
of each of said red, green and blue lights;
a polarizing element disposed in the optical
path of each of said red, green and blue lights for
20 converting each of said lattice-like patterns into
substantially dense polarized light;
said polarizing element having a polarizing
dividing surface provided on substantially the whole
of one surface of a plane parallel plate and a
25 reflecting surface intermittently provided on the
other surface of the plane parallel plate, the
lattice-like light pattern from said illuminating

1 system entering obliquely from said other surface,
partial lights forming said lattice-like light
pattern being divided into reflected light and
transmitted light differing in polarization direction
5 from each other by said polarizing dividing surface,
said reflected light being reflected by said
reflecting surface and directed in a direction
substantially parallel to said transmitted light,
the polarization direction of said reflected light
10 being varied to thereby make it coincident with the
polarization direction of said transmitted light;

an image generator for modulating said dense
polarized light in conformity with a video signal
to thereby generate image light, said generator being
15 disposed in the optical path of each of said red,
green and blue lights and generating each of red,
green and blue image lights; and

a projecting optical system for projecting
said image light.

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35. A projector having:

a light source for supplying light;

color resolving means for resolving said
light into red, green and blue lights;

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means for converting each of said red,
green and blue lights into a lattice-like light
pattern, said means being disposed in the common

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5 a polarizing element disposed near said
converting means for converting each of said lattice-
like light patterns into substantially dense
polarized light;

an image generator for modulating said dense
25 polarized light in conformity with a video signal to
thereby generator image light, said generator being
disposed in the optical path of each of said red,

